THE IMPACT OF TEAM SOCIAL ROLE PERFORMANCE ON TEAM COHESION AND TEAM PERFORMANCE

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ABSTRACT

This study examined the relationships between team social role performance, team cohesion, and team performance. The team social roles examined were those identified by Mumford, Campion, and Morgeson (2006): Cooperator, Communicator, and Calibrator. The Group Environmental Questionnaire (GEQ) developed by Carron, Widmeyer, and Brawley (1985) provided the measure of team cohesion on the individual and group levels. Performance reports from the GLO-BUS business simulation game provided team performance scores. Results indicated that mean team social role performance and the standard deviation of team social role performance are significantly correlated and predictive of team cohesion. In addition, results indicated a non-significant relationship between the mean and standard deviation of team social role performance and team performance as identified by the GLO-BUS simulation game.

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LIST OF ABBREVIATIONS

ATG, Individual-level Team Cohesion

ATGS, Individual Attractions to the Group – Social

ATGT, Individual Attractions to the Group – Task

GEQ, Group Environment Questionnaire

GI, Group-level Team Cohesion

GIS, Group Integration – Social

GIT, Group Integration – Task

ICC, Intra-class Correlation

IRR, Inter-rater Reliability

CHAPTER 1

INTRODUCTION

This thesis manuscript is divided into five chapters. The first chapter presents an outline of how the chapters work together to form a cohesive document. The second chapter provides a literature review of team roles, team cohesion, team performance, and the proposed hypotheses. Chapter three provides an explanation for the methods used to test the hypotheses. This includes information on the procedure, participants, and measures used. The fourth chapter details the results found from testing the hypotheses. It also provides reliability estimates for the measures used. Chapter five indicates the implications, limitations, areas of future research, and conclusions identified after examining the results provided in Chapter four.

CHAPTER 2

LITERATURE REVIEW

Teams are a collection of interdependent individuals who achieve goals and accomplish tasks through shared responsibility (Cohen & Bailey, 1997). Given the appropriate setting, the use of teams has considerable benefits (Hackman, 1998). According to Hoerr (1989), teams are particularly useful in fluid organizational contexts where decision-making is done by those directly involved with the task. Teams also have the potential to meet employees' social needs and boost their organizational involvement (Partington & Harris, 1999; Thurow, 1983). Further, research suggests that teams can drastically improve productivity and decrease errors (Osburn, Moran, Musselwhite, & Zenger, 1990).

Given these benefits, teams may be a viable work design option for organizations looking to boost outcomes and performance (Kozlowski & Klein, 2000). However, individuals cannot be arbitrarily thrown together to form an effective team. According to Hackman (1998), an effective team requires a defined group structure in three areas: task, norm, and composition.

Team tasks must be clearly outlined, meaningful, and challenging for teams to be successful (Hackman, 1998). Further, teams need to establish basic team norms, as well as accepted and expected behaviors. This allows the team to focus on the task at hand instead of continually debating acceptable behaviors. Last, teams must have the appropriate composition of individuals (Hackman, 1998). Team composition has a significant impact on team performance and represents the configuration of the team's attributes, such as demographic characteristics,

abilities, and opinions (Kozlowski & Bell, 2003; Levine & Moreland, 1990; Tziner & Eden, 1985).

Out of the three areas, determining appropriate team composition has been the most difficult for researchers and practitioners alike. Optimum team configuration occurs when each team member is able to utilize and directed his or her strengths and attributes towards accomplishing the desired goal in a collaborative manner. Unfortunately, there is not a consensus on a standardized method for achieving optimum team configuration (Bell, 2007).

Belbin (1981) attempted to resolve the problem of achieving optimum team composition by developing a method for determining which combination of individuals would result in the most effective management team. Belbin assigned participants with the highest mental ability to one team, called the "Apollo" team. He then used a business simulation game to test team performance. While intuitively appealing, teams composed of participants with the highest general mental ability (GMA) repeatedly scored below expectations in the business simulation. Belbin found what he called the "Apollo syndrome": Apollo team members often engaged in debates to convince other team members to accept their own perspectives, while discrediting the ideas of others. Belbin stated that in this type of team, "the lack of coherent teamwork nullified the gains of individual effort or brilliance" (p. 11). Further, these teams lacked social cohesion, illustrated by their deficiencies in communication and cooperative problem solving. Belbin's study provided two valuable lessons to help direct future team composition research: 1) determining the best combination of individuals for a team is complex and requires more than simply considering members' general mental abilities, and 2) team cohesion must be considered in determining this combination of individuals.

The present study builds on Belbin's (1981) findings to advance the literature on optimal team composition by analyzing team role composition and its impact on team performance and team cohesion. Team roles are "clusters of related behaviors that perform critical functions within the team," (Mumford, Campion, & Morgeson, 2006, p. 319). Team performance is the extent to which a team executes tasks and fulfills its responsibilities (Bernardin, Hagan, Kane, & Villanova, 1998; Devine & Phillips, 2001). Team cohesion represents team members' commitment to each other and to accomplishing mutually shared tasks and objectives (Carron & Brawley, 2000; Goodman, Ravlin, & Schminke, 1987; van Vianen & De Dreu, 2001).

Social team roles are of particular importance and represent clusters of interpersonal behaviors that are critical to the team's functionality (Mumford et al., 2006). The fulfillment and coordination of social roles is necessary for team effectiveness, prevention of harmful conflict, and social loafing (Steiner, 1972). Further, the performance of social team roles creates autonomy, competence, relatedness, communication that is open, as well as a supportive and rewarding team environment (Levi, 2001; Sawyer, 2007). Examining social team roles addresses both of Belbin's key findings: does composition, defined by social role performance, predict team performance above and beyond GMA, and must teams exhibit a certain level of social role performance to be effective.

The team role taxonomy developed by Mumford et al. (2006) was used to identify social roles performed within a team; these roles are: Communicator, Cooperator, and Calibrator. Therefore, the present study also functions as a validation study of Mumford et al.'s taxonomy in terms of its relationship to team performance and team cohesion.

Team Roles

Benne and Sheats (1948) developed the first team role taxonomy. Their research began after identifying a gap in research on training individual team members to perform specific roles. Previous training focused solely on those in leadership roles. However, Benne and Sheats believed effective leadership hinges on the relationships between the leader and the members. They also believed the productivity and effectiveness of a team was not solely dependent on the individual in the leadership role, but on the team as a whole.

Benne and Sheats (1948) developed three broad categories of roles outside of the traditional leadership role: 1) group task roles, 2) group building and maintenance roles, and 3) individual roles. Individuals filling a group task role facilitate and coordinate efforts within the team to identify and address problems. Individuals who help the group function as a unit fulfill the group building and maintenance roles. Individuals in the individual roles focus inwardly and on personal goals. They also identified specific roles under each of the broad role categories (Appendix A).

Bales (1950) built on Benne and Sheats' (1948) original listing of group roles by developing operational definitions for characteristics which can be found within the three broad categories. Bales renamed Benne and Sheats' categories as social-emotional (positive), task (neutral), and social-emotional (negative). Each of these broad categories encompasses a number of observable behaviors (Appendix B).

Along with his work identifying the "Apollo syndrome," Belbin (1981) compiled a list of team roles (Appendix C). He defined team roles as patterns of behavior through which members interact and impact the performance of the team as a whole. Belbin assigned individuals to teams to assess the impact of role composition. He found that teams with compositions that restricted

team cohesion often performed below expectations. He further stated that, "what is needed is not well-balanced individuals but individuals who balance well with one another" (Belbin, 1981, p. 77).

Different team role taxonomies and assessments continued to be developed and examined throughout the 1980's and 1990's (e.g. Ancona & Caldwell, 1988; Ancona & Caldwell, 1992; Barry, 1991; DuBrin, 1995; McCann & Margerison, 1989, 1995; Parker, 1994). However, it was not until 2006 that Mumford, Campion, and Morgeson developed an integrated team-role typology. Mumford et al. (2006) conducted a thorough review of the current literature on team roles, resulting in the identification of 120 team roles. They then used a Q-sort methodology to group similar roles. The evaluation of these groups resulted in the identification of ten roles within three broad role categories: task (5), boundary-spanning (2), and socio-emotional (3) (Appendix D).

Task roles illustrate the different clusters of behavior required to accomplish team objectives (Mumford et al., 2006). These roles include: Contractor, Creator, Contributor, Completer, and Critic. The boundary-spanning roles encompass behaviors team members exhibit when functioning outside of the team. The two boundary-spanning roles are Consul and Coordinator. The performance of task and boundary-spanning roles are necessary for a team to be successful. However, based on Belbin's (1981) conclusion, the three social roles, Communicator, Cooperator, and Calibrator, might the most critical in determining the success of a team.

Social Team Roles

Social, or socio-emotional, roles are of particular importance due to their strong correlation to team cohesion and team performance (Blumberg, 2001; Stewart, Fulmer, & Barrick, 2005). Despite the level of individual talent, teams lacking interpersonal skills will fall short of performance expectations (Belbin, 1981; Katzenbach & Smith, 1993; Stevens & Campion, 1994, 1999; Stewart, Manz, & Sims, 1999). Some evidence suggests that organizations are also realizing the importance of social skills, as many are starting to use social skills as a criterion for selection decisions (e.g., Ryan and Ployhart (2014).

Mumford et al.'s (2006) typology lists three social roles: Communicator, Cooperator, and Calibrator. According to Mumford et al., the Communicator role represents behaviors that foster a positive social environment and collaboration. This role is particularly valuable for socially complex tasks and in high stress situations. The behaviors associated with the Cooperator role deal mainly with supporting other team members and the team as a whole. It reflects a willingness to accept decisions made by the team. This helps the team focus on the tasks at hand, and not on coaxing members into accepting a controversial viewpoint. The Calibrator role analyzes and changes social processes within the team. Behaviors often include observing social processes, informing the team of its social processes, and suggesting changes for improvement on social processes. The Calibrator role is particularly useful when social processes are ambiguous or when emotional conflict is hindering team performance.

Social Team Roles and Team Cohesion

Team cohesion is comprised of interpersonal or social cohesion and task cohesion (van Vianen & De Dreu, 2001). Social cohesion reflects attraction to relationships in the team, while task cohesion reflects attraction to the shared commitment of the team to accomplish specific goals (van Vianen & De Dreu, 2001). Effective teams exhibit team cohesion through a positive perception towards fellow team members, functional working relationships, and collaboration (Chung, 2009). According to Hoffman, Kinlaw, and Kinlaw (2002), both forms of cohesion must be present for teams to excel. For the proposed study, social and task cohesion will be measured at the group and individual levels.

Stewart et al. (2005) analyzed the link between team roles, personality traits, and team-level outcomes. The study identified task and social roles using Bales (1950) team role taxonomy. Stewart et al. found a negative correlation between the variance of team members' perceptions of their team member's social role performance and team cohesion. Further, they found that teams with a higher mean and lower variance on social roles tended to rank higher on team cohesion (Stewart et al., 2005). This study attempted to replicate these findings; however, with the use of Mumford et al.'s (2006) team role taxonomy.

Social Team Roles and Team Performance

There are two types of team performance: outcome performance and behavioral performance (Chiocchio & Essiembre, 2009). Behavioral performance is how individuals or team achieve tasks or outcomes. In the present study, I analyzed outcome performance; end results or work consequences resulting from behaviors. I determined team performance by using the GLO-BUS business simulation game outcome performance reports (more details on the

GLO-BUS business simulation game are presented in the Methodology section). Using a business simulation game to evaluate team performance aligns with previous measures of team performance (e.g., Belbin, 1981; Jehn & Mannix, 2001; Jordan & Troth, 2011).

Along with the findings on team cohesion, Steward et al. (2005) also examined the impact of social role performance on team performance. They found a negative relationship between the variance in perceptions of team social role performance and team performance. This was based on team member evaluations of social role performance within the team and instructor evaluations of overall team performance (Stewart et al., 2005). This aligns with Cannon-Bowers, Tannenbaum, Salas, and Volpe (1995) results, which found that a minimum level of interpersonal skills must be present for a team to effectively perform. In addition, research conducted by Toquam, Westra, Fujita, and Murphy (1997) also found that teams with homogenous social skills often performed better than teams with more heterogeneous social skills.

Other interpersonal factors that positively predict project team performance are conflict management, communication, and cooperative problem solving (Chong, 2007; Druskat & Kayes, 2000). These factors are similar to the behaviors outlined in Mumford et al.'s (2006) taxonomy for social role performance. Individuals who excel at conflict management, communication, and cooperative problem solving should also receive high scores on social role performance from their fellow team members. Therefore, a strong positive correlation should exist between social role performance and team performance.

Hypotheses

In-line with the preceding background, teams with higher levels of social role performance exhibit greater levels of team cohesion (Stewart et al., 2005). Further, because teams must exhibit some level of team cohesion to perform effectively (Hoffman et al., 2002), I expected that average team social role performance would correlate with overall team performance. The mean of team members' social role performance perceptions were used as it provides the best representation of the teams' social role performance composition (Bell, 2007).

H1 – Mean team social role performance is positively correlated and predictive of (a) team cohesion on the individual and group level and (b) team performance

Existing research indicates that variability in team members' perceptions of social performance by their team members impacts performance and cohesion (Stewart et al., 2005). As the standard deviation of social role performance within a team increases, the team's cohesion and performance decreases. However, Stewart et al. (2005) did not use Mumford et al.'s (2006) taxonomy. As a result, I used the social team roles identified by Mumford et al. (2006) to test the relationship between variability of social role performance and both team cohesion and team performance.

H2 – The standard deviation of team social role performance is negatively correlated and predictive of (a) team cohesion on the individual and group level, and (b) team performance

CHAPTER 3

METHODOLOGY

Procedure

Each team, comprised of four individuals, participated in a business simulation game (GLO-BUS) lasting eight weeks within a fifteen week semester. Using GLO-BUS allowed for a standardized measure of team performance and aligns with previous team research collecting information on team performance (e.g.Belbin, 1981; Jehn & Mannix, 2001; Jordan & Troth, 2011). GLO-BUS is a business game that simulates the interaction between competing digital camera companies in an international market (Thompson et al., 2013).

GLO-BUS requires teams to produce and market cameras, as well as maintain corporate responsibilities to stakeholders in four geographic regions: Europe-Africa, North America, Asia-Pacific, and Latin America. The course instructor encouraged teams to utilize team members' function backgrounds to develop company strategies and tactics. To implement strategies and tactics, teams were provided a wide variety of options including: overall camera quality, camera performance features, work force compensation, worker training, and warranty length (Thompson et al., 2013). Teams entered game decisions, such as adjustments to dividends or camera quality, using the GLO-BUS dashboards. These dashboards represented the different functional areas of the company (e.g., property, plant, and equipment, marketing, stocks, corporate image, etc.). At the end of each decision week, GLO-BUS used an algorithm to evaluate each teams' game decisions relative to other teams' game decisions and to changes in

the international market. GLO-BUS generated performance reports for each of the eight decisions rounds.

Surveys assessing team social role performance and team cohesion were administered using Qualtrics online survey software at three different points during the semester: 09/10-09/14, 10/10-10/15, and 11/15-11/25. I administered the first round of surveys after the practice GLO-BUS simulation round at the beginning of the semester, this ensured the teams had met and engaged in team activities at least once before taking the first round of surveys. Multiple distributions allowed for the development of cohesion over time within the teams (Chiocchio & Essiembre, 2009).

I collected demographic information (age and gender), GPA, ACT score, and past experience with business simulation games at the end of each questionnaire. Performance has the potential to influence cohesion (Mullen & Copper, 1994). To prevent potential contamination of perceptions of social role performance by actual performance ratings generated by GLO-BUS, I administered the questionnaires to participants before teams received updated performance ratings.

Participants

The sample consisted of business students working in teams within two business management classes at a public university located in the Southeastern United States of America. I selected participants as representatives of the population to which the results are to generalize; teams in the workforce. Existing research indicates that research conducted outside of the lab setting using college student teams, and that mimic management teams appropriately, generalizes to teams in the workforce (Chiocchio, 2007; Chiocchio & Essiembre, 2009; Jaffe & Nebenzahl,

1990; Mullen & Copper, 1994). Teams participating in the study existed for a limited duration and disband after the completion of the GLO-BUS business simulation game exercise.

Four hundred and forty-eight individuals were asked to participate; 224 individuals from each class. The course instructor assigned individuals to four-person teams based on student ID numbers, resulting in 112 four-person teams. Three hundred and sixty-two individuals participated in the first round of surveys (81%). Three hundred and fifty-seven individuals participated in the second round (80%). Three hundred and ninety-eight individual participated in the third round (89%). Three hundred and seven individuals participated in all three rounds; 68.5% of possible participants.

I collected demographic information at the end of each survey. Participants' ages ranged from 19 to 37 years old. The mean age of participants was 21 years old, with a standard deviation of 2.33. In the first survey round there were 202 male (56%) and 160 female (44%) participants. In the second survey round there were 194 male (54%) and 163 female (46%) participants. In the third survey round there were 220 male (55%) and 178 female (45%) participants. The majority of participants were white, representing 80.5% of participants across all three round. In Round 1, 80.7% of participants were white, 8.8% were black, 6.9% were Asian, 1.7% were Hispanic, 0.3% were Native American, and 1.7% indicated "Other". In Round 2, 80.4% of participants were white, 9.2% were black, 6.4% were Asian, 2.0% were Hispanic, 0.6% were Native American, and 1.4% indicated "Other". In Round 3, 80.4% of participants were white, 9.3% were black, 6.0% were Asian, 2.0% were Hispanic, 0.3% were Native American, and 2% indicated "Other".

The mean of participants' ACT scores of for all three rounds was 25. The mean GPA of participants for Round 1 was 3.14, the mean for Round 2 was 3.16, and the mean for Round 3 was 3.12. Only 9 participants (2%) indicated prior experience in business simulation games in

the first round. Twelve participants (3%) indicated prior experience in Round 2, and 14 participants (4%) indicated prior experience in Round 3. I collected past game experience as previous exposure to the simulation game could provide an advantage and distort the relationships between social role performance, cohesion, and team performance.

Measures

Social Role Performance Questionnaire

Social team role performance was measured during each of the three survey rounds using a peer-evaluation questionnaire developed by Mumford, Morgeson, Iddekinge, and Campion (2008). This questionnaire has been found in other studies to be a reliable measure of team social role performance, with an interrater agreement coefficient, $r_{within\text{-}group}$ (r_{wg}), of .87 (Mumford et al., 2008). Participants used a 5-point Likert scale to rate their team members' level of performance for each of the three team social roles: Communicator, Cooperator, and Calibrator.

Group Environment Questionnaire

I measured team cohesion during each of the survey rounds using a modified Group Environment Questionnaire (GEQ). A self-assessment questionnaire was chosen as cohesion is subjective in nature and is difficult for outside observers to measure (Chiocchio & Essiembre, 2009). The GEQ assess four components of cohesion: Individual Attractions to the Group – Social (ATGS), Individual Attractions to the Group – Task (ATGT), Group Integration – Social (GIS), and Group Integration – Task (GIT) (Carron, Widmeyer, & Brawley, 1985). *Individual Attractions* (ATG; individual-level cohesion) reflect the individual's personal motivations and feelings about the group. *Group Integration* (GI; group-level cohesion) reflects the individual's

perceptions about what the group believes about its degree of closeness, unity, and similarity among members. *Individual Attractions* and *Group Integration* further divide into *Task* and *Social* cohesion. *Task* cohesion is indicative of how motivated the individual is towards accomplishing mutual tasks and objectives. *Social* cohesion refers to how motivated the individual is to maintain and develop social relationships within the group (Carron et al., 1985).

Carron et al. (1985) originally developed the GEQ for sports teams. However, the GEQ has been found to be reliable and valid for use as a measure of team cohesion for work teams as well (Brawley, Carron, & Widmeyer, 1987; Carron & Brawley, 2000; Carron et al., 1985). I modified wording in the original GEQ to better align with student teams participating in the GLO-BUS business simulation game. For example, I replaced references to "practice" with "team meeting". The three administration of the GEQ over the duration of the 8-week GLO-BUS business simulation game surpassed Chiocchio and Essiembre's (2009) suggested four weeks of team interaction, better allowing participating teams to develop cohesion factors. I calculated reliability estimates using Cronbach's Alpha for each round to confirm existing research indicating the GEQ as a reliable measure of team cohesion.

Team Performance

The GLO-BUS business simulation game provided the measure for team performance. GLO-BUS evaluated each team using the Investor Expectations (I.E.) Company Score and the Best-in-Industry (B-I-I) Standard Company Score (Thompson et al., 2013). The I.E. Company Score indicates how well each team annually met or exceeded five performance targets. The five performance targets were: 1) grow earnings per share by 8% annually, 2) maintain a return on equity investment of 15% annually, 3) maintain a B+ credit rating, 4) achieve an "image rating"

of 70, and 5) achieve stock price gains averaging 8% annually. Performance targets were predetermined in the GLO-BUS software package; therefore, the instructor and the teams were not involved in determining the specifics of the performance targets. Teams received a bonuses of 0.5% for each 1.0% that actual performance exceeded target performance. The B-I-I Company Score indicates how well each team performed relative to the "best-in-industry" teams. The teams with the best scores for the five performance targets earn the highest number of points. Remaining teams receive points based on what percentage of the "best-in-industry" teams' performance they were able to achieve. The mean of I.E. and B-I-I indicated "Overall Score" (Thompson et al., 2013). I used the Overall Score collected after each of the eight simulation rounds as the measure of team performance.

Overall GLO-BUS team performance scores ranged from 14 to 110 over the eight week period. Teams who received a score of 14 likely obtained minimal points out of the possible 120 I.E. points from failing to meet the performance targets. In addition, teams with an overall score of 14 performed poorly in comparison to the "best-in-industry" team, and would have received minimal points out of the possible 100 B-I-I points. Teams who received a score of 110 received the maximum 120 points from exceeding the performance targets and received the maximum 100 points from being the "best-in-industry" team. Week 1 had the highest mean of team scores at 80.75, while Week 7 had the lowest mean of team score at 70.688. The standard deviation in scores increased every week, except for Week 3 to Week 4.

CHAPTER 4

RESULTS

Reliability

Social Role Performance Questionnaire

Inter-rater reliability (IRR) is used to evaluate the degree of agreement between multiple raters evaluating a particular construct (Hallgren, 2012). The procedure determines whether variance in the observed scores is due to variance in the true scores or due to variance from measurement error between coders. The output of an IRR analysis provides an estimate for what portion of the observed variance is due to variance in the true score.

I computed the intra-class correlation (ICC) using SPSS to evaluate the IRR of the social role performance questionnaire. ICC is a commonly used statistic for evaluating IRR for non-categorical variables (Hallgren, 2012). I used the two-way model for the analysis, as raters were specific team members and not randomly selected from the population of raters. This created a fully crossed design. Further, raters selected were fixed and not randomly sampled; therefore, I used a mixed effects model. According to Shrout and Fleiss (1979), this is the ICC (3,K) method. Absolute agreement was used as systematic differences between ratings was considered relevant in determining reliability (Hallgren, 2012).

To qualify for the analysis, team members had to be rated by at least two other team members to provide a comparison between raters. However, three team members provided a large number of ratings. This allowed me to calculated ICCs for three raters, instead of just two.

In Round 1, at least two team members rated 398 individuals and at least three team members rated 205 individuals. In Round 2, at least two team members rated 387 individuals and at least three team members rated 209 individuals. In Round 3, at least two team members rated 421 individuals and at least three team members rated 285 individuals.

The social role performance questionnaire is comprised of three constructs: Cooperator, Communicator, and Calibrator. Therefore, I separated the ratings by construct and round. This provided nine ICC calculations: three constructs across three rounds. I also calculated the aggregated ICC estimates based on the mean ICC estimates for each round (Table 4.1). The team social role performance ratings exhibited a negative skew. This could have created a restriction of range and influenced the ICC estimates (Hallgren, 2012). Therefore, I calculated the logarithm of the team social role performance scores and then reflected the logarithm to reevaluate the ICC estimates. However, this technique did not improve the ICC estimates.

Table 4.1 Social Role Performance Questionnaire Reliability Analysis with Three Raters

					Avg. Measures 95% CI		
Measure	***N***	**Avg. Measures ICC**	**Scale *M***	**Scale *SD***	**Lower Bound**	**Upper Bound**	**Sig.**
1st Round							
Cooperation	205	0.47	37.88	5.26	0.33	0.58	0.00
Communicator	205	0.45	39.06	5.25	0.30	0.57	0.00
Calibrator	205	0.38	37.05	5.66	0.21	0.51	0.00
2nd Round							
Cooperation	211	0.49	37.80	5.77	0.35	0.60	0.00
Communicator	211	0.56	38.65	6.12	0.45	0.66	0.00
Calibrator	211	0.32	35.37	6.64	0.15	0.47	0.00
3rd Round							
Cooperation	287	0.61	37.20	6.78	0.52	0.68	0.00
Communicator	287	0.62	37.51	7.22	0.53	0.69	0.00
Calibrator	287	0.45	35.36	7.36	0.34	0.56	0.00
Overall (Aggregated Mean)							
Cooperation		0.52	37.62	5.94	0.40	0.62	0.00
Communicator		0.54	38.41	6.20	0.43	0.64	0.00
Calibrator		0.38	35.93	6.55	0.23	0.51	0.00

Notes. N = number of valid cases, *M* = Mean, *SD* = Standard Deviation

According to Cicchetti (1994), ICCs below .40 are considered "poor". With the exception of the Communicator role, the aggregated mean ICC estimates fell below the .40 threshold. I identify potential problems associated with the low ICC estimates later in the limitations section of Chapter 5. I also provide the rationale for why these low estimates are justifiable.

Group Environment Questionnaire

I used Cronbach's Alpha to determine the reliability of the GEQ. The GEQ examined four constructs: Individual Attractions to the Group – Social (ATGS), Individual Attractions to the Group – Task (ATGT), Group Integration – Social (GIS), and Group Integration – Task (GIT). I calculated reliability estimates for each construct across each of the three distribution rounds (Table 4.3). Results indicated the GEQ modified for work or student teams provides a high level of reliability based on the sample used (Henson, 2001).

Table 4.2 Group Environment Questionnaire Reliability Analysis

Measure	Number of Items	Item *M*	Scale *M*	Scale *SD*	Alpha (*α*)
1st Round (N = 362)					
Individual Attractions to the Group – Social (ATGS)	5	4.48	22.41	5.09	0.73
Individual Attractions to the Group – Task (ATGT)	4	5.37	21.46	5.49	0.84
Group Integration – Task (GIT)	5	5.31	26.54	5.13	0.76
Group Integration – Social (GIS)	4	4.24	16.98	4.66	0.69
2nd Round (N = 357)					
Individual Attractions to the Group – Social (ATGS)	5	4.47	22.35	5.68	0.76
Individual Attractions to the Group – Task (ATGT)	4	5.22	20.89	5.57	0.85
Group Integration – Task (GIT)	5	5.19	25.96	6.29	0.83
Group Integration – Social (GIS)	4	4.20	16.78	5.38	0.79
3rd Round (N = 398)					
Individual Attractions to the Group – Social (ATGS)	5	4.31	21.57	5.95	0.77
Individual Attractions to the Group – Task (ATGT)	4	4.92	19.68	5.90	0.84
Group Integration – Task (GIT)	5	5.01	25.04	6.45	0.83
Group Integration – Social (GIS)	4	4.02	16.08	5.11	0.72
Overall (Aggregated Mean)					
Individual Attractions to the Group – Social (ATGS)		4.42	22.11	5.57	0.75
Individual Attractions to the Group – Task (ATGT)		5.17	20.67	5.65	0.84
Group Integration – Task (GIT)		5.17	25.84	5.96	0.80
Group Integration – Social (GIS)		4.15	16.61	5.05	0.73

Notes. *N* = number of valid cases, *M* = Mean, *SD* = Standard Deviation

Hypothesis Tests

The social role performance peer-evaluation questionnaire separates social roles into three constructs: Communicator, Cooperator, and Calibrator. However, the scale means for these scores are closely aligned (Table 4.1). This suggests the three roles measured a similar construct. Therefore, I combined the three roles to form a single measure of team social role performance. I then aggregated team social role performance scores to the team level using the mean team scores (Hypothesis 1) and the standard deviation of within team scores (Hypothesis 2).

Preliminary analysis indicated that scores across the four cohesion scales, ATGS, ATGT, GIS, and GIT, were highly correlated. This suggested that the four types of cohesion measured a similar construct. Therefore, I aggregated GEQ scores to individual-level and group-level cohesion for testing Hypothesis 1(a) and Hypothesis 2(a).

There are two primary justifications for these aggregations. First, GLO-BUS measured team performance on the team level. Therefore, to test the hypotheses all variables needed to be on same level of aggregation. Second, Stewart et al. (2005) aggregated scores to the team level and used the mean and standard deviation to conduct their analysis. To accurately compare the results of this study to those of Stewart et al.'s study, I needed to replicate their method as closely as possible.

The aggregation provided 112 mean team social role performance scores for each of the three distribution rounds. At least two members from the same team had to participate to calculate the standard deviation. Four teams in Round 1, three teams in Round 2, and two teams in Round 3 failed this criterion. Therefore, testing for Hypothesis 2 consisted of 108 teams in Round 1, 109 teams in Round 2, and 110 teams in Round 3.

I also calculated the overall scores for both team social role performance and team cohesion by combining results from all three distribution rounds. This provided aggregated scores for each team throughout the simulation game exercise and represented overall mean team social role performance, overall standard deviation of team social role performance, overall individual-level cohesion, and overall group-level cohesion. I used these scores, along with the results from the individual rounds, to test the hypotheses.

Hypothesis 1 proposed a positive relationship would exist between mean team social role performance, team cohesion, and team performance. Hypothesis 2 proposed a negative relationship would exist between the standard deviation of team social role performance and team cohesion and team performance. To test these hypotheses, I conducted a simple correlation analysis (Table 4.4) including the following variables: mean team social role performance, standard deviation of team social role performance, individual-level team cohesion (ATG), group-level team cohesion (GI), team performance, GPA, and ACT team scores. I calculated correlations for each of the distribution rounds, as well as the aggregated overall scores for the three rounds. Results showed significant positive correlations ($p < .01$) between mean team social role performance and both individual-level and group-level cohesion. Results also indicated a significant negative correlation ($p < .01$) between the standard deviation of team social role performance and team cohesion on both levels. Additionally, results indicated non-significant correlations between mean team social role performance, the standard deviation of team social role performance, and GLO-BUS team performance scores. However, the correlation between the standard deviation of team social role performance and GLO-BUS team performance scores was significant in Round 3, which provided partial support for Hypothesis 1(b).

Table 4.3 Mean and Standard Deviation of Team Social Role Performance, Team Cohesion, and Team Performance Correlations Table

Round	Item	1	2	3	4	5	6	7
1st	1. GPA	-						
	2. ACT	.40**	-					
	3. Individual-level Team Cohesion (ATG)	.04	-.07	-				
	4. Group-level Team Cohesion (GI)	.08	-.10	.87**	-			
	5. Mean Team Social Role Performance	.00	-.10	.63**	.58**	-		
	6. Standard Deviation of Team Social Role Performance	-.11	.07	-.46**	-.47**	-.70**	-	
	7. Team Performance	-.10	-.07	.04	-.03	-.03	.08	-
2nd	1. GPA	-						
	2. ACT	.37**	-					
	3. Individual-level Team Cohesion (ATG)	.11	-.08	-				
	4. Group-level Team Cohesion (GI)	.18	.04	0.89**	-			
	5. Mean Team Social Role Performance	.12	-.05	0.76**	0.78**	-		
	6. Standard Deviation of Team Social Role Performance	-.12	.03	-.50**	-.58**	-.65**	-	
	7. Team Performance	-.08	.08	.05	.01	.04	.03	-
3rd	1. GPA	-						
	2. ACT	.33**	-					
	3. Individual-level Team Cohesion (ATG)	.21*	.03	-				
	4. Group-level Team Cohesion (GI)	.19*	-.02	.90**	-			
	5. Mean Team Social Role Performance	.11	-.01	.70**	.72**	-		
	6. Standard Deviation of Team Social Role Performance	-.04	-.05	-.48**	-.50**	-.60**	-	
	7. Team Performance	-.10	.07	.11	.10	.21*	-.02	-

Notes. GPA = Grade Point Average; ACT = American College Testing; ATG = Individual-level Team Cohesion; GI = Group-level Team Cohesion; Team Performance = GLO-BUS Team Performance Score

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 4.3 Continued

Round	Item	1	2	3	4	5	6	7
Overall	1. GPA	-						
	2. ACT	.36**	-					
	3. Individual-level Team Cohesion (ATG)	.14	-.04	-				
	4. Group-level Team Cohesion (GI)	.18	-.04	.93**	-			
	5. Mean Team Social Role Performance	.12	-.04	.77**	.79**	-		
	6. Standard Deviation of Team Social Role Performance	-.08	.04	-.53**	-.61**	-.71**	-	
	7. Team Performance	-.07	.04	.08	.03	.03	-.01	-

Notes. GPA = Grade Point Average; ACT = American College Testing; ATG = Individual-level Team Cohesion; GI = Group-level Team Cohesion; Team Performance = GLO-BUS Team Performance Score

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

I conducted a linear regression analysis as an additional test for Hypothesis 1(a) and to further investigate the relationship between mean team social role performance and team cohesion (Table 4.5). I used mean social role performance as the IV and individual-level and group-level cohesion as the DVs for the regression analyses. GPA and ACT were included as covariates to determine if general mental ability was predictive of GLO-BUS team performance. The regression analysis indicated team social role performance was predictive of team cohesion in subsequent periods at both the individual and group levels.

I then repeated the procedure to analyze Hypothesis 1(b) and examine the relationship between mean team social role performance and GLO-BUS team performance scores (Table 4.6). The GLO-BUS simulation game reported team performance after each simulation round, totaling eight collection points. I calculated the GLO-BUS team performance score for Round 1 by aggregating GLO-BUS team performance scores from week 1 through week 3 using the mean. For Round 2, I repeated this procedure, but used GLO-BUS team performance scores from weeks 4 through week 7. Week 8 comprised the single GLO-BUS team performance score for Round 3; therefore, there was no need to aggregate. For the overall score, I calculated each teams' mean performance score across the eight week period. Similar to Hypothesis 1(a), GPA and ACT functioned as the control variables. Results from the regression analyses indicated team social role performance was not a significant predictor of GLO-BUS team performance.

Table 4.4 Hypothesis 1(a): Mean Team Social Role Performance and Team Cohesion Regression Model Summary

Round	DV	Model IV's	*β*	*R* Square	Adj. *R* Square
1st	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.01	-0.01
		2. Mean Team Social Role Performance	0.62	0.40	0.38
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.16	0.01
		2. Mean Team Social Role Performance	0.57	0.59	0.33
2nd	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.03	0.01
		2. Mean Team Social Role Performance	0.75	0.58	0.57
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.03	0.02
		2. Mean Team Social Role Performance	0.78	0.79	0.61
3rd	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.04	0.03
		2. Mean Team Social Role Performance	0.69	0.51	0.49
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.04	0.03
		2. Mean Team Social Role Performance	0.70	0.53	0.52
Overall	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.04	0.03
		2. Mean Team Social Role Performance	0.69	0.51	0.49
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.04	0.03
		2. Mean Team Social Role Performance	0.70	0.53	0.52

Notes. GPA = Grade Point Average; ACT = American College Testing; ATG= Individual-level Team Cohesion; GI = Group-level Team Cohesion; β = Beta

Table 4.5 Hypothesis 1(b): Mean Team Social Role Performance and Team Performance Regression Model Summary

Round	DV	Model IV's	*β*	*R* Square	Adj. *R* Square
1st	Team Performance	1. GPA & ACT		0.01	-0.01
		2. Mean Team Social Role Performance	-0.04	0.01	-0.02
2nd	Team Performance	1. GPA & ACT		0.02	0.00
		2. Mean Team Social Role Performance	0.06	0.02	0.00
3rd	Team Performance	1. GPA & ACT		0.02	0.01
		2. Mean Team Social Role Performance	0.23	0.08	0.05
Overall	Team Performance	1. GPA & ACT		0.01	-0.01
		2. Mean Team Social Role Performance	0.10	0.02	-0.01

Notes. GPA = Grade Point Average; ACT = American College Testing; Team Performance = GLO-BUS Team Performance Score; β = Beta

I used linear multiple regression to further test Hypothesis 2, which stated there is a negative relationship between the variability of a team's social role performance and their cohesion and team performance. For Hypothesis 2(a), I used the standard deviation of team social role performance for the IV and individual-level and group-level cohesion as the DVs in the regression analyses. GPA and ACT scores functioned as control variables. The regression analyses showed a negative beta-value and moderate R^2 values (Table 4.7).

To test Hypothesis 2(b), I use the same GLO-BUS team performance scores used in Hypothesis 1(b) for each of the three rounds and for the overall score. This procedure determined if variability in team members' perceptions of other team member's social role performance was predictive of GLO-BUS team performance. Results mirrored those from Hypothesis 1(b). The regression analyses showed the standard deviation in team social role performance ratings, indicating variability in team members' perceptions of other team member's social role performance, is a poor predictor of GLO-BUS team performance (Table 4.8).

Table 4.6 Hypothesis 2(a): Standard Deviation of Team Social Role Performance and Team Cohesion Regression Model Summary

Round	DV	Model IV's	*β*	*R* Square	Adj. *R* Square
1st	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.03	0.01
		2. *SD* of Team Social Role Performance	-0.45	0.23	0.21
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.05	0.03
		2. *SD* of Team Social Role Performance	-0.46	0.25	0.23
2nd	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.07	0.05
		2. *SD* of Team Social Role Performance	-0.48	0.29	0.27
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.04	0.02
		2. *SD* of Team Social Role Performance	-0.57	0.36	0.34
3rd	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.05	0.03
		2. *SD* of Team Social Role Performance	-0.48	0.28	0.25
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.06	0.05
		2. *SD* of Team Social Role Performance	-0.50	0.31	0.29
Overall	Individual-level Team Cohesion (ATG)	1. GPA & ACT		0.03	0.01
		2. *SD* of Team Social Role Performance	-0.52	0.29	0.27
	Group-level Team Cohesion (GI)	1. GPA & ACT		0.05	0.03
		2. *SD* of Team Social Role Performance	-0.59	0.39	0.38

Notes. GPA = Grade Point Average; ACT = American College Testing; ATG= Individual-level Team Cohesion; GI = Group-level Team Cohesion; β = Beta. *SD* = Standard Deviation

Table 4.7 Hypothesis 2(b): Standard Deviation of Team Social Role Performance and Team Performance Regression Model Summary

Round	DV	Model IV's	*β*	R Square	Adj. R Square
1st	Team Performance	1. GPA & ACT		0.02	0.00
		2. *SD* of Team Social Role Performance	0.07	0.03	0.00
2nd	Team Performance	1. GPA & ACT		0.03	0.01
		2. *SD* of Team Social Role Performance	0.01	0.03	0.00
3rd	Team Performance	1. GPA & ACT		0.03	0.01
		2. *SD* of Team Social Role Performance	-0.02	0.03	0.00
Overall	Team Performance	1. GPA & ACT		0.01	-0.01
		2. *SD* of Team Social Role Performance	-0.03	0.01	-0.02

Notes. GPA = Grade Point Average; ACT = American College Testing; Team Performance = GLO-BUS Team Performance Score; β = Beta. *SD* = Standard Deviation

CHAPTER 5

DISCUSSION

Hypothesis Tests

Hypothesis 1(a) stated there is a positive relationship between mean team social role performance and team cohesion. Results provided significant support for this proposition. This suggests a strong link between social role performance and cohesion; teams that exhibit social roles are also likely to exhibit cohesive behavior. Further, performance of team social roles was predictive of team cohesion. This provides evidence that teams comprised of individuals who are effective Communicators, Calibrators, and Cooperators will also be effective in establishing team cohesion on the individual-level and the group-level.

With the exception of Round 3, the Hypothesis 1(b) analysis indicated a non-significant relationship between the mean team social role performance and team performance. Given the high correlation between team social role performance and team cohesion, this was surprising as team cohesion is often associated with team performance (Beal, Cohen, Burke, & McLendon, 2003). I developed a scatter-plot to further examine the relationship between overall mean team social role performance and overall team performance.

The graph illustrated a slight quadratic trend to this relationship, with data conforming to an inverse-U shape. Therefore, I conducted an analysis to evaluate a linear versus quadratic relationship using the SPSS Curve Estimation function. This procedure showed an improvement in the R^2 from .007 to .026. However, the results were still non-significant. I then identified and

removed outliers to determine if some of the abnormal data points had skewed the results. I did this by calculating the *z*-scores for each teams' mean social role performance scores. This allowed me to identify which mean team social role performance scores deviated significantly from the norm. I removed all team social role performance scores and their corresponding GLO-BUS team performance scores that were greater than 2 *z*-score units from the mean, leaving a sample of 106 teams who more accurately represented the typical trend or pattern of data within this sample. I then replicated the procedure used above to re-evaluate the quadratic relationship; the R^2 for this model improved to a statically significant .070 (p = .024). This provides strong evidence for a quadratic relationship between team social role performance and team performance.

Results from the Hypothesis 2(a) indicated that variability in social role performance perceptions among team members is negatively correlated and predictive of team cohesion. Equity theory is a possible explanation for why the variability of team members' perceptions correlates to team cohesion. Equity theory proposes that individual will view outcomes as fair when the outcome to input ratio is perceived as equal across individuals (Adams, 1963; Adams & Jacobsen, 1964). If individuals perceive the outcome to input ratio as unfair, individuals will feel mistreated and will attempt to adjust the outcome to input ratio. Individuals accomplish this by altering the outcomes, inputs, or changing the comparison referents (Adams, 1963; Adams & Jacobsen, 1964).

One of the ways individuals could have adjusted the outcome to input ratio is through their social role performance input. The GLO-BUS simulation game generated performance outcomes based on the team level and does not use individual social role performance as a scoring criterion. Therefore, if Team Member A puts forth effort to communicate, cooperate, or

calibrate effectively, he or she will receive the same team performance score as Team Member B who does not put forth the same level of effort. This creates a disparity in the outcome to input ratio, which can lead to tension between team members and damage team cohesion.

To compensate for the disparity, Team Member A might adjust his or her effort to perform the social roles to match that of Team Member B. As individuals' social role performance efforts align, the tension between team members will decrease. Team Member A and Team Member B will put forth the same level of effort in performing the social roles and they will receive the same level of outcomes (e.g., equal communication, cooperation, and relational calibration). This will justify their actions and lead to improved cohesion within the team.

The Hypothesis 2(b) analysis indicated that the standard deviation of team social role performance was not correlated or predictive of team performance. Following the post-hoc procedure used for Hypothesis 1(b), I examined the scatter-plot of team performance and the standard deviation of team social role performance. Data points formed a circular pattern and confirmed the lack of relationship between the two variables.

Implications

The results supporting Hypothesis 1(a) suggest that training individuals to better perform Communicator, Calibrator, and Cooperator roles could benefit team cohesion. For example, trainers could facilitate role-play situations were individuals practice analyzing social situations to look for ways to appropriately adjust the social processes (e.g., Calibrator role). This is similar to other interpersonal or "soft" skills training; however, the team role taxonomy provides three distinct areas of interpersonal behavior for the training to target. Trainers can use the

standardized set of behaviors defined for each role in the team role taxonomy for behavioral benchmarks and goals.

The more focused analysis of Hypothesis 1(b) indicated a possible quadratic relationship between mean team social role performance and team performance. If this relationship is accurate, it suggests that it might be detrimental for a team to exhibit high levels of the social roles. For example, a team that is primarily focused maintaining cooperation might lose the benefits of task conflict. This could hamper innovation and creative ideas. In addition, this relationship indicates that moderate levels of social role performance can lead to better team performance than high levels of social role performance. Future research should continue to examine this relationship to determine the optimal level of social role performance and if the results from this study can generalize to other teams.

Results from the Hypothesis 2(a) analysis provided partial support for Stewart et al.'s (2005) study involving the impact of social role performance consistency within teams. Stewart et al. found that variance of social role performance within a team is negatively correlated to cohesion. In addition, the consistency of social role performance within a team had a greater impact on team performance than the teams' mean social role performance. Results provided support for their first proposition. However, the correlation coefficients and the R^2 values were smaller than the values found in Hypothesis 1(a). This suggests that consistency of social role performance within teams is significant in determining team cohesion, but not to the same degree as mean team social role performance. However, when assigning individuals to teams, this result indicates the importance of taking into account the level of effort each individual will put forth to perform the social roles. Separating high effort and low effort social role performance

individuals into different teams ensures an appropriate input to outcome ratio. This assignment technique will increase team cohesion on the individual and group levels.

The high correlations between team social role performance and team cohesion supports Hypothesis 1(a) and Hypothesis 2(a). However, the high correlations might also indicate shared characteristics between the constructs. I comprised a table to examine the questions from the team social role performance peer-evaluation questionnaire and the GEQ to determine if commonalities exist. I identified eight questions from the GEQ that matched behaviors identified in the team social role performance peer-evaluation questionnaire, specifically the Communicator and Cooperator roles. I did not identify any similarities between the GEQ and the Calibrator role.

Table 5.1 Group Environment Questionnaire and Team Social Role Performance Descriptive Comparison

Selected GEQ Questions	Associate Team Social Role Performance Behavior
Individual-level Cohesion (ATG)	*Cooperator*
I do not feel like my teammates value my opinions	Supports the team and its goals after having given input, even if
I enjoy the social interactions I have with my team	he/she would have personally set different goals
	Admits when others have more experience in particular areas and
I enjoy meeting with the people in my team	trusts their judgment
This team does not give me enough opportunities to develop academically	Recognizes the expertise of others and allows them to take a leadership role in the team
Group-level Cohesion (GI)	*Communicator*
Members of our team would rather go out on their own than get together as a team	Makes the work pleasant and comfortable by being happy and easy to work with
Our team rarely spends time socializing before or after class/team meetings	Communicates personal feelings and thoughts respectfully and without offending anyone
If members of our team have problems in class or with an assignment, everyone wants to help them	Listens carefully to the thoughts and feelings of others
Our team members do not communicate freely about each other's team responsibilities	

I conducted a post-hoc analysis to examine the correlations between each of the mean team social roles and team cohesion on both the individual and group levels. Results indicated high correlations similar to those found in the overall team social role performance analysis. However, the Calibrator role had a slightly lower correlation coefficient to individual and group level cohesion than Communicator and Cooperator. Eight of the eighteen questions in the GEQ matched closely with social role behaviors. This supports the proposition that team social role performance and team cohesion are similar constructs. However, determining the degree of similarity requires additional analysis using a factor analysis or measurement model.

Limitations

I identified three core limitations to the study. The first is the ICC ratings used to evaluate the reliability of the team social role performance peer-evaluation questionnaire are poor. There are three possible explanations for the low ICCs. First, the raters did not receive training on how to appropriately evaluate social role performance behavior. The lack of training prevented the raters from developing a common frame of reference to evaluate social role performance. The steady increase of ICC estimates over-time illustrates this point. As raters became more familiar with the rating process and determining social role performance, the ICC estimates improved.

The motivation and mindfulness of the raters could also have influenced the raters' effort and precision while rating team members. Using college students for the sample is appropriate; however, the students' motivation to complete the surveys in an honest and accurate manner is questionable. The course instructor provided extra credit for completing the surveys. Therefore, student raters could have completed the survey simply for the extra credit and failed to make the appropriate evaluations of social role performance.

Lastly, social role performance is somewhat relative as it requires interaction between two or more individuals. How an individual acts towards one team member might differ from how that individual acts towards other team members. This is particularly relevant given the lack of training previously mentioned. For example, Team Member A could communicate well with Team Member B, but not Team Member C. Team Member B would likely rate Team Member A high on communication. However, Team Member C would likely rate Team Member A low on communication. Both would be justifiable evaluations from the raters' perspective; however, this would distort the ICC estimates.

The second limitation I identified involves the level of interdependence required to accomplish the task. The GLO-BUS simulation games provides an excellent opportunity for students to develop an understanding of company-wide strategies and tactics. However, there is no control over how the teams contrive or implement strategies and tactics. Some teams could have relied heavily on different team members' areas of expertise, while other teams dominated by a single team member. Interdependence is one of the key aspects of a team; therefore, the lack of control in this area is significant on a theoretical bases. Some GLO-BUS teams might function as teams, while others might simply be a group of individuals relying on one person to perform effectively.

Unfortunately, GLO-BUS does not require team interdependence for success. Specifically, GLO-BUS does not facilitate task interdependence. According to Wageman and Gordon (2005), task interdependence occurs when individual are required to exchange resources and provide help to fellow team members to complete a task. This requirement is absent in GLO-BUS, as performance within the simulation game is not dependent on the team's level of interdependence or cohesion. Instead, the simulation game simply evaluates the strategies and

tactics implemented within the game's system. Therefore, a single person could accomplish the same results as a team of four individuals.

This led to the third limitation; GLO-BUS performance evaluation does not consider behavioral or efficiency outcomes. The game only evaluates strategies and tactics. There is no evaluation of how those strategies or tactics were developed. A team characterized by relational conflict, inefficiency, and a lack of cohesion could still perform well within the simulation game. In a real-world team setting, this would not be feasible. Further, this questions the validity of using the GLO-BUS simulation game as a team activity.

Future Research

The low ICC estimates question the reliability of the team social role performance peer-evaluation questionnaire. Future research should examine if modifications are need to improve rater consistency or if the results from this study generalize to other samples. One option is evaluating ICCs collected from raters' using two different peer-evaluation questionnaires. The control group would receive the non-altered version of the peer-evaluation questionnaire. The experimental group would receive a modified peer-evaluation questionnaire which includes corresponding examples of strong versus poor Communication, Cooperation, or Calibration role behavior. The calculation of ICC estimates could then determine if the behavioral examples added to the consistency of rater responses. Future research could also use a pre-/post-training method to determine if training increases rater consistency.

Future research should evaluate the division of team social role performance into three constructs. I conducted a post-hoc analysis to determine the correlations between Communicator, Cooperator, and Calibrator using the overall mean social role performance scores. Results

indicated high significant correlations, each above .80. Future research should use confirmatory factor analysis to determine if the social roles identified by Mumford et al. (2006) are indeed three separate constructs. If Communicator, Cooperator, and Calibrator are three distinct constructs, future research should also examine the impact of individual social roles on team cohesion and team performance.

I used the full data-set in testing the proposed hypotheses. However, as illustrated in the discussion of Hypothesis 1(b), removing outliers could lead to additional information regarding the impact of team social role performance on team performance. This is common practice when outliers significantly impact the analyses (Walfish, 2006). An outlier is an observation that does not align with other observations made within the same data set and deviates from the normal distribution of the data set (Walfish, 2006).

Two simple methods for identifying outliers are a box plot and trimmed means (Walfish, 2006). Box plots graph the data into quartiles around the median. The upper quartile represents the 75^{th} percentile, while the lower quartile represents the 25^{th} percentile. The box plot also provides upper and lower "fences", which are calculated based on a particular distance from the interquartile range. Generally, any observations beyond these fences are outliers.

I used a variation of the trimmed means method in examining Hypothesis 1(b). This method eliminates outliers by removing upper and lower scores within a data set based on percentages. The most common technique is trimming the mean by 10%, which removes all data points in the top 5% and the bottom 5% of scores within a data set (Walfish, 2006). However, using *z*-scores to identify outliers can account for negatively or positively skewed data by matching the data to a normal distribution. This method should be used to determine if outliers impacted the ICC estimates calculated for the team social role peer-evaluation questionnaire.

Future research could also use this method to examine if outliers altered the relationship between team social role performance, team cohesion, and team performance.

I conducted a post-hoc analysis to determine if team cohesion, on both the individual level and the group level, correlated to team performance as measured by the GLO-BUS simulation game. As noted in the discussion of Hypothesis 1(b), results indicated non-significant relationships. This was somewhat surprising as prior research has indicated team cohesion is often associated with team performance and considered one of the most important variables in small group behavior (Beal et al., 2003; Carless & De Paola, 2000; Carron & Brawley, 2000). The non-significant relationship between team cohesion and team performance supports the limitations of GLO-BUS team performance evaluations; however, it also indicates a need for future research.

Beal et al. (2003) found that team cohesion has a greater effect on team efficiency as opposed to team effectiveness. Further, cohesiveness in teams has a higher correlation to performance defined as a particular set of behaviors than performance defined as a specific output (Beal et al., 2003). GLO-BUS only evaluates effectiveness and game specific outcomes. If I had used behavioral outcomes as the measure of performance, the relationship between team cohesion and team performance might have changed. Additionally, given the high correlation between team social role performance and team cohesion, the relationship between team social role performance and team performance could change. Future research should evaluate the relationships between team social role performance, team cohesion, and performance defined by specific behavioral outcomes and efficiency.

The non-significant relationship between team cohesion and team performance also questions the use of GLO-BUS as an effective tool for evaluating team performance. As

mentioned in the limitations section, the GLO-BUS simulation game does not require task structure interdependence. This undermines one of the core characteristics of teams; collaboration to achieve a common goal, task, or purpose. Therefore, GLO-BUS might not be a team activity at all. For example, the GLO-BUS interface only allows for one set of decisions at time. Team Member A cannot make adjustments to the sales figures while Team Member B adjusts stock pricing. The two cannot work simultaneously. This forces the team to break decisions into sections, which team members can perform with little to no interaction with other team members.

Future research should examine the GLO-BUS evaluation process and the level of interdependence exhibited by teams during the simulation. One option is observing teams making game decisions, as this would allow the researcher to determine the level of interaction between team members. Another option is developing a study that compares performance results between four-person teams and individuals working alone.

Future research should also examine whether the team social role performance peer-evaluation questionnaire is a partial mediator between Mumford et al. (2006)'s situational judgment test and team cohesion. The team social role performance peer-evaluation is the second assessment in the team role performance suite developed by Mumford et al. (2006). The first assessment is a situational judgment test that determines how well an individual understands the different roles in a team and when to perform those roles. Mumford et al. (2008) found the situational judgment test both reliable and valid in predicting how well an individual performs on the team peer-evaluation. This study provides the second piece of the equation, indicating that performance on the team peer-evaluation questionnaire relates to team cohesion. Combining the results of this study and those of Mumford et al. (2008) could indicate a partial mediation

between the situational judgment test and team cohesion. If this relationship does exist, an organization could use the situational judgment test to determine which individuals would exhibit high levels of cohesion within a team. This could be extremely valuable if the task assigned to the teams requires a high level of cohesion for success.

Conclusion

Results from this study provide a number of contributions to the current literature on team roles, team cohesion, and the methods used to evaluate team performance. First, results indicated a significant correlation between team social role performance and cohesion on the individual and group levels. Second, results provided partial support for Stewart et al. (2005)'s findings, which indicated that variation in team social role performance within a team is negatively correlated to team cohesion. Third, results suggest the need for additional research regarding the reliability of Mumford et al. (2008)'s team role peer-evaluation questionnaire. Last, results indicated the GLO-BUS simulation game needs greater examination to determine its effectiveness at evaluating team performance. These contributions increase our understanding of team roles, team cohesion, and team performance evaluation methods, as well as open the door for continued research in multiple areas.

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APPENDIX A

The University of Tennessee at Chattanooga IRB Approval Letter

THE UNIVERSITY of TENNESSEE CHATTANOOGA

Institutional Review Board
Dept. 4915
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MEMORANDUM

TO: Graham Lowman
Dr. Brian O'Leary

IRB #15-030

FROM: Lindsay Pardue, Director of Research Integrity
Dr. Bart Weathington, IRB Committee Chair

DATE: February 24, 2015

SUBJECT: IRB #15-030: The Impact of Team Social Role Performance on Team Cohesion and Team Performance

The IRB Committee Chair has reviewed and approved your application and assigned you the IRB number listed above. You must include the following approval statement on research materials seen by participants and used in research reports:

The Institutional Review Board of the University of Tennessee at Chattanooga (FWA00004149) has approved this research project #15-030.

Since your project has been deemed exempt, there is no further action needed on this proposal unless there is a significant change in the project that would require a new review. Changes that affect risk to human subjects would necessitate a new application to the IRB committee immediately.

Please remember to contact the IRB Committee immediately and submit a new project proposal for review if significant changes occur in your research design or in any instruments used in conducting the study. You should also contact the IRB Committee immediately if you encounter any adverse effects during your project that pose a risk to your subjects.

For any additional information, please consult our web page http://www.utc.edu/irb or email us at: instrb@utc.edu .

Best wishes for a successful research project.

APPENDIX B

BENNE AND SHEATS' TEAM ROLE TAXONOMY

APPENDIX B: BENNE AND SHEATS' TEAM ROLE TAXONOMY

Benne and Sheats Team Role Taxonomy			
Role Categories:	Group Task Roles	Group Building and Maintenance Roles	Individual Roles
Specific Roles:	Initiator-contributor	Encourager	Aggressor
	Information seeker	Harmonizer	Blocker
	Opinion seeker	Compromiser	Recognition-seeker
	Information giver	Gate-keeper and expediter	Self-confessor
	Opinion giver	Standard setter or Ego ideal	Playboy
	Elaborator	Group-observer and Commentator	Dominator
	Coordinator	Follower	Help-seeker
	Orienteer		Special interest pleader
	Evaluator-critic		
	Energizer		
	Procedural technician		
	Recorder		

Benne, K. D., & Sheats, P. (1948). Functional roles of group members. *Journal of Social Issues*, *4*(2), pp. 44-46.

APPENDIX C

BALES' OPERATIONAL DEFINTIONS FOR TEAM ROLES

APPENDIX C: BALES' OPERAIONAL DEFINTIONS FOR TEAM ROLES

Operational Definitions for Team Roles	
Role Category:	Social-emotional (positive)
Operational Definitions:	Show solidarity, raises other's status, gives help, rewards
	Shows tension release, jokes, laughs, shows satisfaction
	Agrees, shows passive acceptance, understands, concurs, complies
	Gives suggestion, direction, implying autonomy for others
Role Category:	Task (neutral)
Operational Definitions:	Gives opinion, evaluation, analysis, expresses feeling, wish
	Gives orientation, information, repeats, clarifies, confirms
	Asks for orientation, information, repetition, and confirmation
	Asks for option, evaluation, analysis, expression of feeling
	Asks for suggestion, direction, possible ways of action
Role Category:	Social-emotional (negative)
Operational Definitions:	Disagrees, shows passive rejection, formality, withholds resources
	Shows tension: ask for help, withdraws out of field
	Shows antagonism, deflates other's status, defends or asserts self

Bales, R. F. (1950). Interaction process analysis: A method for the study of small groups. Cambridge, MA: Addison-Wesley. (p.9).

APPENDIX D

BELBIN'S TEAM ROLE TAXONOMY

APPENDIX D: BELBIN'S TEAM ROLE TAXONOMY

Type	Type Characteristics
Company Worker	Conservative, dutiful, predictable
Chairman	Calm, self-confident, controlled
Shaper	High strung, outgoing, dynamic
Plant	Individualistic, serious-minded, unorthodox
Resource Investigator	Extroverted, enthusiastic, curious, communicative
Monitor-Evaluator	Sober, unemotional, prudent
Team Worker	Socially orientated, rather mild, sensitive
Completer-Finisher	Painstaking, orderly, conscientious, anxious

Belbin, R. M. (1981). Management teams: Why they succeed or fail. New York, NY: John Wiley & Sons, Inc. (p. 78).

APPENDIX E

MUMFORD, CAMPION, AND MORGESON'S TEAM ROLE TAXONOMY

Mumford et al. (2006) Team Role Taxonomy			
Role Categories:	Task	Socio-emotional (social)	Boundary Spanning
Specific Roles:	Contractor Creator Contributor Completer Critic	Cooperator Communicator Calibrator	Coordinator Consul

Mumford, T. V., Campion, M. A., & Morgeson, F. P. (2006). Situational judgment in work teams: A team role typology. In J. A. Weekley & R. E. Ployhart (Eds.), *Situational judgment tests: Theory, measurement, and application* (pp. 319-343). Mahwah, NJ: Erlbaum

APPENDIX F

TEAM SOCIAL ROLE PERFORMANCE PEER-EVALUATION QUESTIONNAIRE

COOPERATOR ROLE (SOCIAL ROLE)

	Team Member	Very Great Extent	Considerable Extent	Moderate Extent	Little Extent	No Extent	Role Description for**: Supportive Team Player Role** Supports the team and other team members in their work even if he/she would have personally done it differently. **Please rate the extent to which each of your team members performs the following actions when needed for team effectiveness.**
A16	«N01»	5	4	3	2	1	a) Supports the team and its goals after having given input, even if he/she would have personally set different goals
B16	«N02»	5	4	3	2	1	
C16	«N03»	5	4	3	2	1	
D16	«N04»	5	4	3	2	1	
E16	«N05»	5	4	3	2	1	
F16	«N06»	5	4	3	2	1	
G16	«N07»	5	4	3	2	1	
A17	«N01»	5	4	3	2	1	b) Admits when others have more experience in particular areas and trusts their judgment
B17	«N02»	5	4	3	2	1	
C17	«N03»	5	4	3	2	1	
D17	«N04»	5	4	3	2	1	
E17	«N05»	5	4	3	2	1	
F17	«N06»	5	4	3	2	1	
G17	«N07»	5	4	3	2	1	
A18	«N01»	5	4	3	2	1	c) Recognizes the expertise of others and allows them to take a leadership role in the team
B18	«N02»	5	4	3	2	1	
C18	«N03»	5	4	3	2	1	
D18	«N04»	5	4	3	2	1	
E18	«N05»	5	4	3	2	1	

COMMUNICATOR ROLE (SOCIAL ROLE)

	Team Member	Very Great Extent	Considerable Extent	Moderate Extent	Little Extent	No Extent	Role Description for**: Good Communicator Role** Communicates clearly, honestly, and respectfully with others, making the work atmosphere more comfortable because he/she is pleasant to work with. **Please rate the extent to which each of your team members performs the following actions when needed for team effectiveness.**
A19	«N01»	5	4	3	2	1	a) Makes the work pleasant and comfortable by being happy and easy to work with
B19	«N02»	5	4	3	2	1	
C19	«N03»	5	4	3	2	1	
D19	«N04»	5	4	3	2	1	
E19	«N05»	5	4	3	2	1	
F19	«N06»	5	4	3	2	1	
G19	«N07»	5	4	3	2	1	
A20	«N01»	5	4	3	2	1	b) Communicates personal feelings and thoughts respectfully and without offending anyone
B20	«N02»	5	4	3	2	1	
C20	«N03»	5	4	3	2	1	
D20	«N04»	5	4	3	2	1	
E20	«N05»	5	4	3	2	1	
F20	«N06»	5	4	3	2	1	
G20	«N07»	5	4	3	2	1	
A21	«N01»	5	4	3	2	1	c) Listens carefully to the thoughts and feelings of others
B21	«N02»	5	4	3	2	1	
C21	«N03»	5	4	3	2	1	
D21	«N04»	5	4	3	2	1	
E21	«N05»	5	4	3	2	1	
F21	«N06»	5	4	3	2	1	

CALIBRATOR ROLE (SOCIAL ROLE)

Role Description for**: Team Facilitator Role**

Helps the team get along together by helping to settle conflicts, deal with difficult problems, and be respectful.

Please rate the extent to which each of your team members performs the following actions when needed for team effectiveness.

	Team Member	Very Great Extent	Considerable Extent	Moderate Extent	Little Extent	No Extent	
A22	«N01»	5	4	3	2	1	a) Helps settle conflicts between members of the team
B22	«N02»	5	4	3	2	1	
C22	«N03»	5	4	3	2	1	
D22	«N04»	5	4	3	2	1	
E22	«N05»	5	4	3	2	1	
F22	«N06»	5	4	3	2	1	
G22	«N07»	5	4	3	2	1	
A23	«N01»	5	4	3	2	1	b) Suggests positive ways for the team to interact such as taking turns, showing respect, and being open to new ideas
B23	«N02»	5	4	3	2	1	
C23	«N03»	5	4	3	2	1	
D23	«N04»	5	4	3	2	1	
E23	«N05»	5	4	3	2	1	
F23	«N06»	5	4	3	2	1	
G23	«N07»	5	4	3	2	1	
A24	«N01»	5	4	3	2	1	c) Steps in if there are negative feelings in the team to help resolve the difficulties
B24	«N02»	5	4	3	2	1	
C24	«N03»	5	4	3	2	1	
D24	«N04»	5	4	3	2	1	
E24	«N05»	5	4	3	2	1	
F24	«N06»	5	4	3	2	1	

APPENDIX G

GROUP ENVIRONMENT QUESTIONNAIRE

Adapted Group Environment Questionnaire

The following questions are designed to assess your feelings about **YOUR PERSONAL INVOLVEMENT** with your team. Please **CIRCLE** a number from 1 to 7 to indicate your level of agreement with each of the statements.

1. I enjoy the social interactions I have with my team. (ATG—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

2. I do not feel like my teammates value my opinions. (ATG—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

3. I am not going to miss the members of my team when the semester ends. (ATG—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

4. I'm unhappy with my team's level of desire to accomplish assignments. (ATG—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

5. Some of my best friends are in this team. (ATG—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

6. This team does not give me enough opportunities to develop academically. (ATG—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

7. I enjoy meeting with the people in my team. (ATG—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

8. I do not like the type of assignments I do with this team. (ATG—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

9. For me, this team is an important social team to which I belong. (ATG—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

The following questions are designed to assess your perceptions of **YOUR TEAM AS A WHOLE.** Please CIRCLE a number from 1 to 7 that best indicates your level of agreement with each of the statements.

10. Our team is united in trying to reach a specific academic standard on assignments. (GI—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

11. Members of our team would rather go out on their own than get together as a team. (GI—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

12. We all take responsibility for any poor performance of our team. (GI—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

13. Our team rarely spends time socializing before or after class/team meetings. (GI—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

14. Our team members have conflicting aspirations for the team's performance. (GI—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

15. Our team would like to spend time together after the semester ends. (GI—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

16. If members of our team have problems in class or with an assignment, everyone wants to help them. (GI—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

17. Members of our team do not stick together outside of class or team meetings. (GI—S)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

18. Our team members do not communicate freely about each other's team responsibilities (GI—T)

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

VITA

Graham Hughes Lowman was born in Jackson, MS, to the parents of Jeff and Sallie Lowman. He has an older sister, Sarah Reynolds. He attended Briarwood Christian School in Birmingham, AL. After High School, he attended the University of Alabama, Tuscaloosa. He majored in Accounting with a specialization in Global Business. He spent the second semester of his junior year studying International Business at the University of Malta. After matriculation, he studied Mandarin at the Sichuan Fine Arts Institute in Chongqing, China for one year. He then returned to the United States and worked as an accounting assistant for nine months before enrolling in the Industrial-Organizational Psychology Master's program at the University of Tennessee at Chattanooga. Graham graduated from the I-O Psychology program in May 2015.